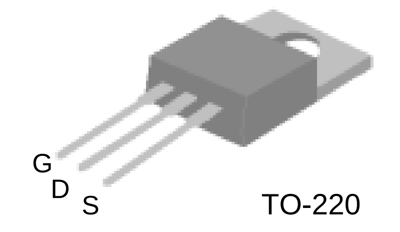


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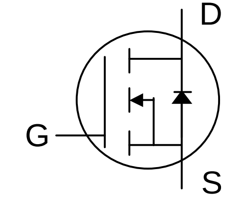
N-CHANNEL ENHANCEMENT-MODE POWER MOSFET

Low gate charge
Simple drive requirement
Fast switching



BV_{DSS}	30V
$R_{DS(ON)}$	17mΩ
I_D	40A

Description



Power MOSFETs from Silicon Standard provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 package is widely preferred for commercial and industrial applications and suited for low voltage applications such as DC/DC converters and high efficiency switching circuits.

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D @ T_C=25°C	Continuous Drain Current, V_{GS} @ 10V	40	A
I_D @ T_C=100°C	Continuous Drain Current, V_{GS} @ 10V	30	A
I_{DM}	Pulsed Drain Current[1]	169	A
P_D @ T_C=25°C	Total Power Dissipation	50	W
	Linear Derating Factor	0.4	W/°C
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter		Value	Unit
Rthj-c	Thermal Resistance Junction-case	Max.	2.5	°C/W
Rthj-a	Thermal Resistance Junction-ambient	Max.	62	°C/W

Electrical Characteristics @ T_j=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	30	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I_D=1mA	-	0.037	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A	-	14	17	mΩ
		V_{GS}=4.5V, I_D=16A	-	20	23	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=20A	-	26	-	S
I_{DSS}	Drain-Source Leakage Current (T_j=25°C)	V_{DS}=30V, V_{GS}=0V	-	-	1	uA
	Drain-Source Leakage Current (T_j=150°C)	V_{DS}=24V,V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}= ± 20V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=20A	-	17	-	nC
Q_{gs}	Gate-Source Charge	V_{DS}=24V	-	3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=5V	-	10	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=15V	-	7.2	-	ns
t_r	Rise Time	I_D=20A	-	60	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω , V_{GS}=10V	-	22.5	-	ns
t_f	Fall Time	R_D=0.75Ω	-	10	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	800	-	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	380	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	133	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)	V_D=V_G=0V , V_S=1.3V	-	-	40	A
I_{SM}	Pulsed Source Current (Body Diode)[1]		-	-	169	A
V_{SD}	Forward On Voltage[2]	T_j=25°C, I_S=40A, V_{GS}=0V	-	-	1.3	V

Notes:

1.Pulse width limited by safe operating area.

2.Pulse width ≤300us , duty cycle ≤2%.

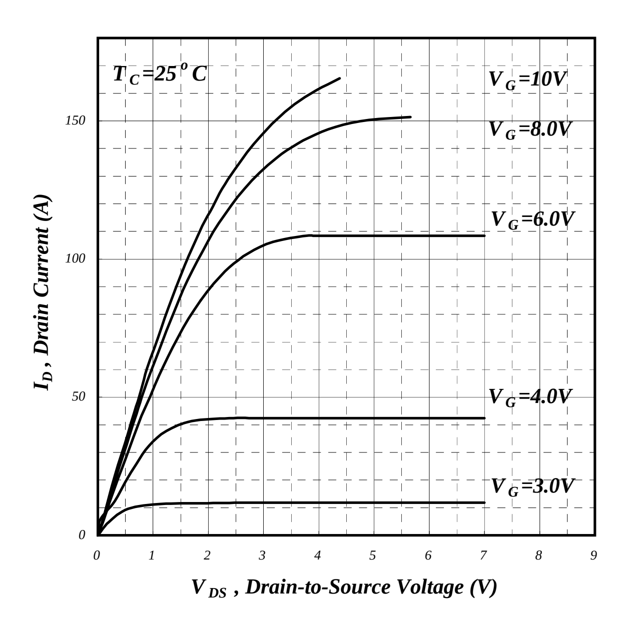


Fig 1. Typical Output Characteristics

Fig 2. Typical Output Characteristics

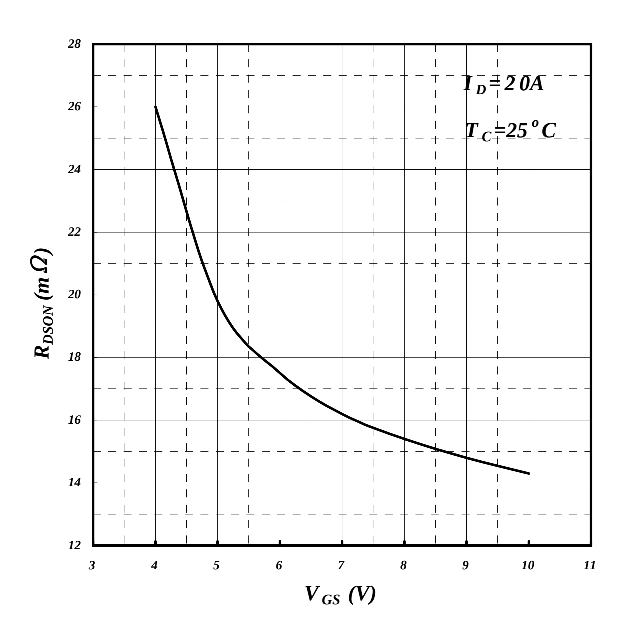



Fig 3. On-Resistance v.s. Gate Voltage

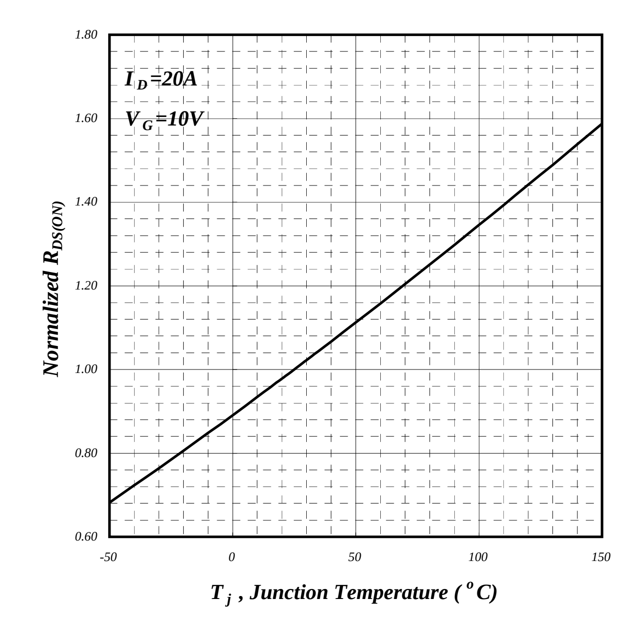
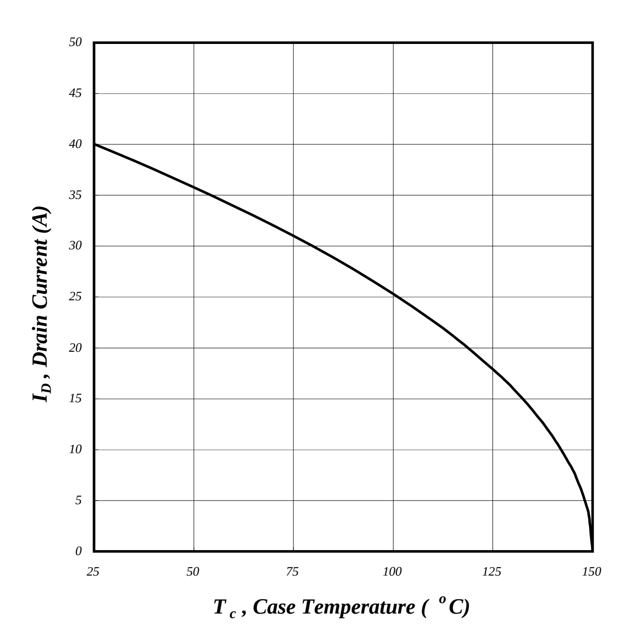
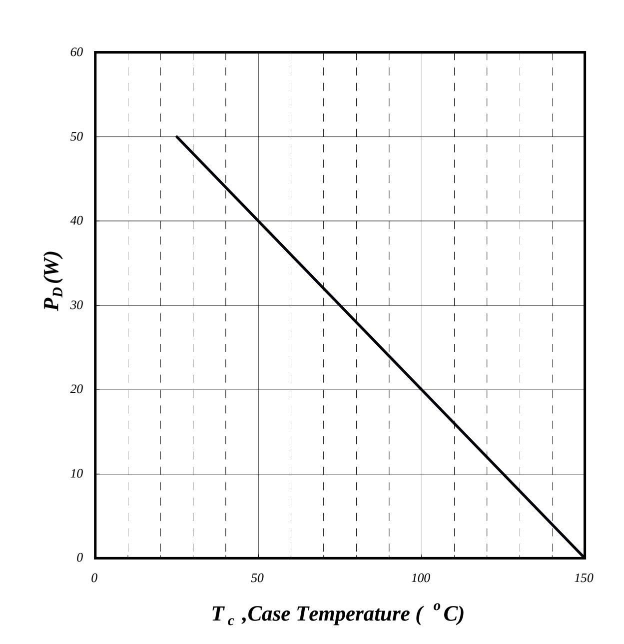


Fig 4. Normalized On-Resistance vs. Junction Temperature





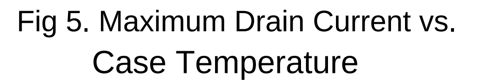
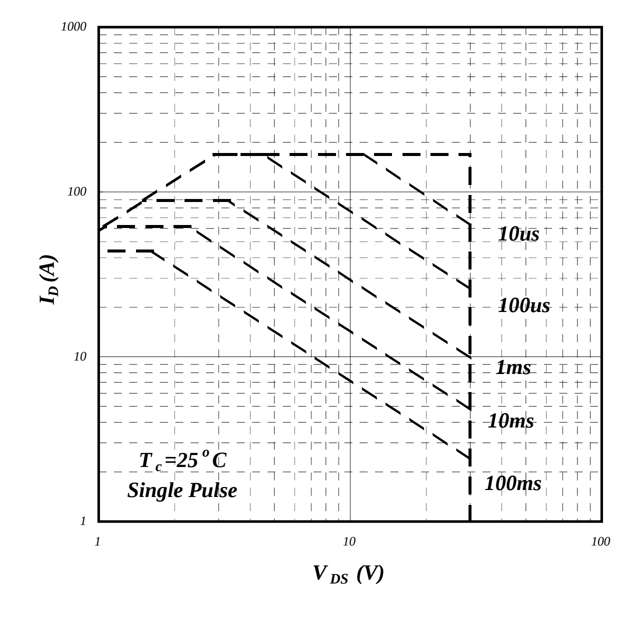

Fig 5. Maximum Drain Current vs. Case Temperature

Fig 6. Typical Power Dissipation



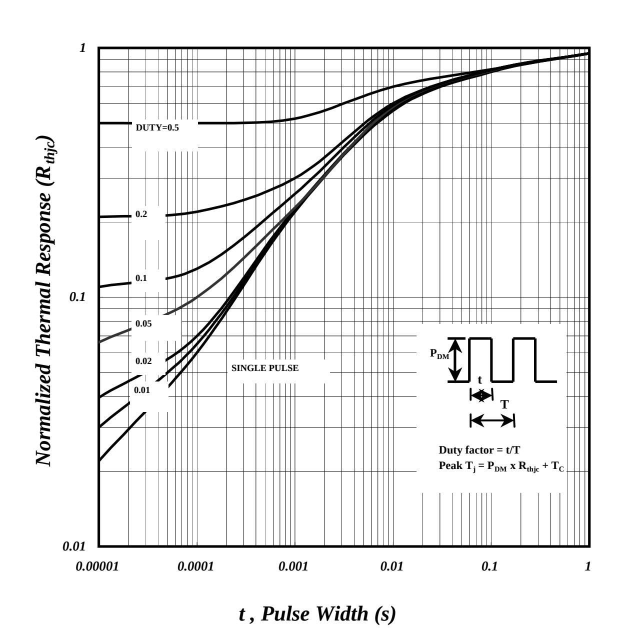


Fig 7. Maximum Safe Operating Area

Fig 8. Effective Transient Thermal Impedance

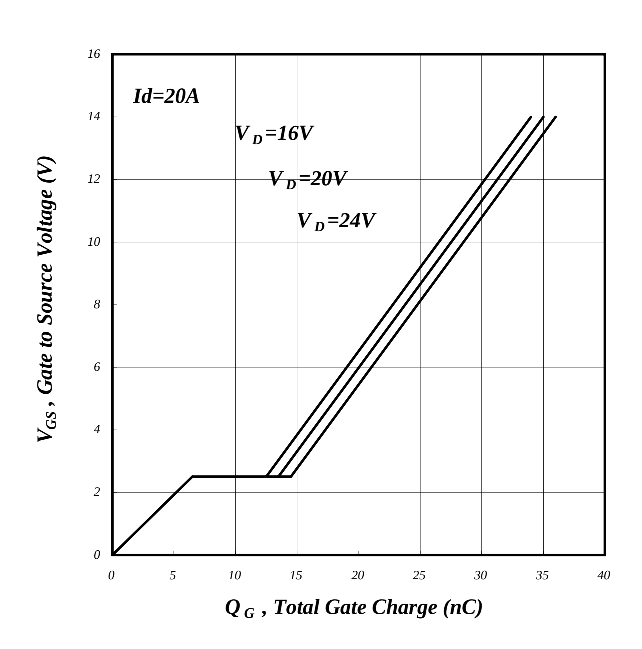


Fig 9. Gate Charge Characteristics

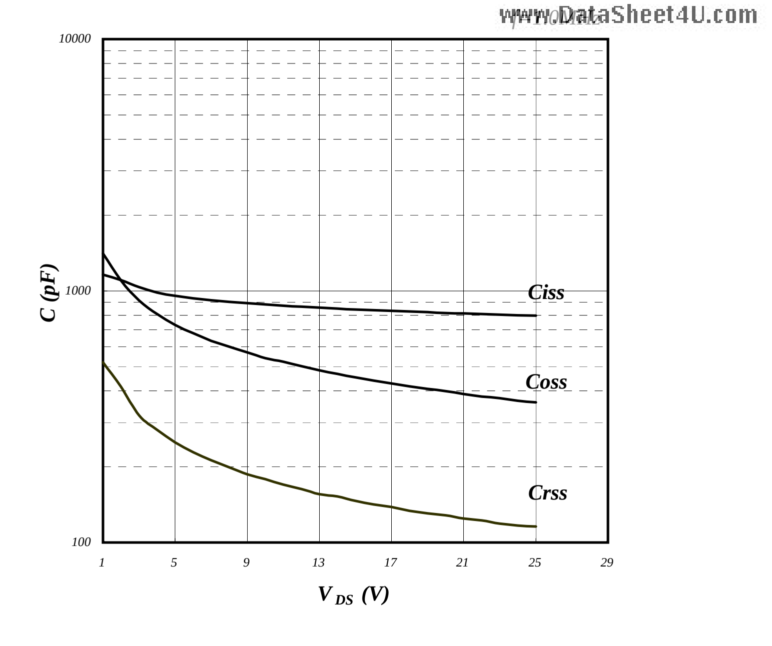


Fig 10. Typical Capacitance Characteristics

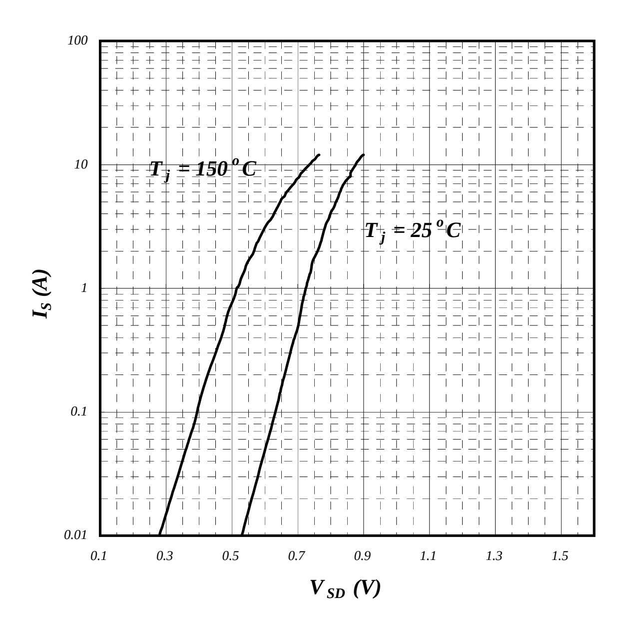




Fig 11. Forward Characteristic of
Reverse Diode

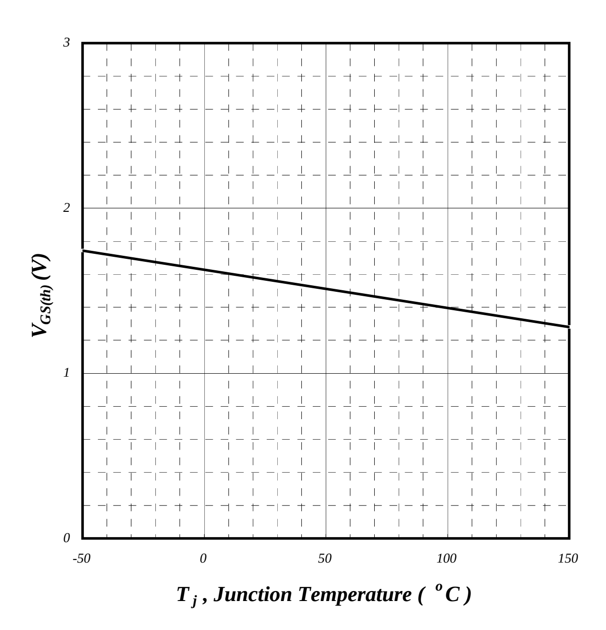
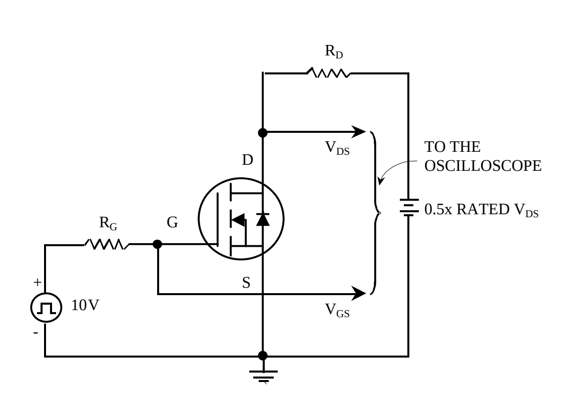


Fig 12. Gate Threshold Voltage vs.
Junction Temperature





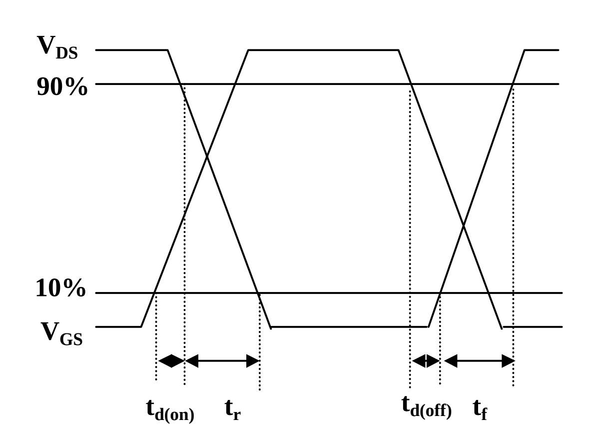
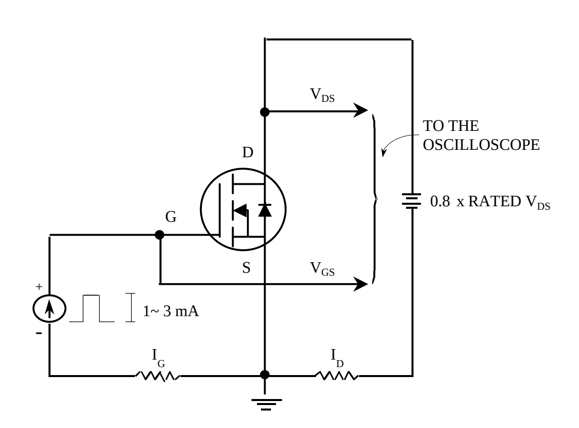


Fig 13. Switching Time Circuit

Fig 14. Switching Time Waveform



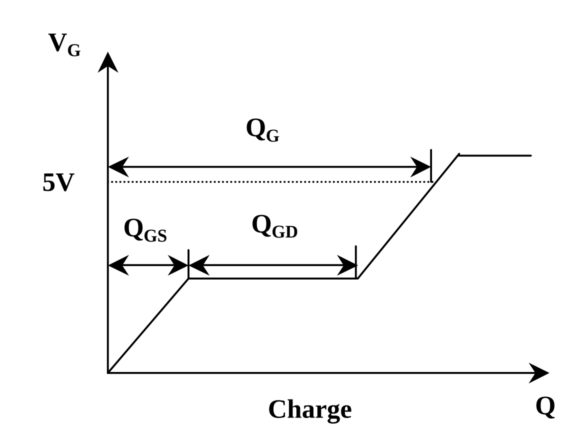


Fig 15. Gate Charge Circuit

Fig 16. Gate Charge Waveform